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PICKERING NGS B INTERIM AQUATIC STUDY 1984 AND 1985

Report No 87-149-K

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ABSTRACT

The results of the third and fourth years of the Pickering NGS B interim aquatic studies conducted in 1984 and 1985 are presented. The data will provide a continuous record of the fish community in the vicinity of Pickering NGS B between the preoperational and postoperational studies. Spottail shiner was the most abundant species in beach seine hauls taken at four transects in the study area in 1984 while rainbow smelt was the most common species in the 1985 beach seine catch. Alewife was the most abundant species in the trap and gill net catches in both years. Average beach seine and trap net catch were lower in 1984 and 1985 than in 1982 and 1983. Average gill net catch was higher in 1984 than in the remaining three years of interim studies while the 1985 catch was lowest. Round whitefish was the main species collected in the mid-November to mid-December spawning study. More round whitefish were caught at Whitby West than at Thickson Point. The average catches of round whitefish increased in 1984 and 1985 relative to 1982 and 1983.

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EXECUTIVE SUMMARY

PICKERING NGS B INTERIM AQUATIC STUDY, 1984 AND 1985

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The results of the third and fourth years of the Pickering NGS B interim aquatic study conducted in 1984 and 1985 are presented in this report. The data collected during this study will provide a continuous record of the fish community of Lake Ontario in the vicinity of Pickering NGS B in the period between the 1979-1981 preoperational study and the 1986-1989 postoperational study. These studies were requested by the Environmental Studies and Assessments Department of the Design and Development Division on behalf of the Pickering Engineering Department. The data collected during these studies will ultimately be used to assess the effects of the station on the surrounding aquatic community.

During the 1984 and 1985 Pickering NGS B interim studies, the juvenile and adult fish populations were sampled along four transects (Pickering A discharge, Pickering B discharge, Duffin Creek and Simcoe Point) by beach seine, trap net and gill net.

Spottail shiner was the most abundant species in the 1984 beach seine catch while rainbow smelt was the most abundant species in the 1985 catch. Greater numbers of fish with a more diverse species composition were taken in beach seine hauls at Duffin Creek than at the remaining locations. Average beach seine catch was lower in 1984 and 1985 than in the first years of interim studies conducted in 1982 and 1983.

Alewife was the most common species taken by trap net in both years. They were most abundant at the Pickering NGS B discharge in 1984 and at Simcoe Point in 1985. Lower catches of alewife accounted for declining trap net catch between 1982 and 1985.

Alewife was also numerically dominant in the 1984 and 1985 gill net catches. In both years total gill net catch was highest at Duffin Creek. Average gill net catch in 1984 was higher than in the remaining years of interim studies while the 1985 average catch was lowest.

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The results of the 1985 round whitefish spawning investigations are also presented in this report. The study involved weekly gill netting at Whitby West and Thickson Point from mid-November through mid-December. Round whitefish was the main species taken during this time period with greater numbers taken at Whitby West than at Thickson Point. The average catch of round whitefish was higher in 1984 and 1985 than in 1982 and 1983.

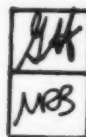


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PICKERING NGS B INTERIM AQUATIC STUDY, 1984 AND 1985

1.0 INTRODUCTION

This report describes fish population surveys conducted in 1984 and 1985 during the third and fourth years of the Pickering NGS B Interim Aquatic Study. The results of the 1985 round whitefish spawning investigations in the inshore area near Whitby are also included. These studies were requested by the Environmental Studies and Assessments Department of the Design and Development Division on behalf of the Pickering Engineering Department.

Data collected during the 1982-1985 Pickering Aquatic Interim Study will provide a continuous record of the fish community of Lake Ontario in the vicinity of Pickering NGS B. A preoperational study was conducted in the area from 1979 to 1981 (Ontario Hydro Research Division Report No 84-135-K) and the postoperational study is scheduled for 1986 to 1989. The data collected during these studies will ultimately be used to assess the effects of the station on the surrounding aquatic community.

Pickering NGS B is a nuclear station consisting of four CANDU power d 540 MW units located on the north shore of Lake Ontario at Pickering, Ontario. Unit 5 came into service in December of 1982, Unit 6 in November of 1984, Unit 7 in November of 1984 and Unit 8 in January of 1986. The station is located on the east side of Pickering NGS A which also consists of four CANDU powered 540 MW units. The two stations have a common surface condenser cooling water intake. Pickering NGS B discharges its cooling water to the east of the development while Pickering NGS A discharges to the west. The calculated temperature increase across the condenser with two pumps per unit and four units operating is estimated at 9.2 C° for Pickering NGS B and 9.7 C° for Pickering NGS A (RMEP-IR-07211-1). Pickering NGS B uses 33.4 m³ of cooling water per unit per second and Pickering NGS A uses 30.8 m³ per unit per second.

Units 1 and 2 at Pickering NGS A were out of service due to pressure tube failure during both 1984 and 1985. Hence the total number of operating units increased from four during most of 1984 to five in 1985.

1.1 Objective

The objective of the 1984 and 1985 interim aquatic studies was to determine the distribution and abundance of juvenile and adult fish in the vicinity of Pickering NGS B. In addition the monitoring of fall-spawning round whitefish in the inshore area near Whitby was continued as initiated in 1981.

1.2 Study Area

The study area covers a 15.5 km stretch of Lake Ontario shoreline from the Pickering NGS A discharge in the west to Thickson Point in the east (Figure 1). The transects fished during the regular spring, summer and fall fishing efforts were the Pickering NGS A discharge, Pickering NGS B discharge, Duffin Creek and Simcoe Point transects. Two transects around Whitby, Whitby West and Thickson Point, were sampled during the fall round whitefish spawning investigations.

2.0 METHODS

2.1 Juvenile and Adult Fish Survey

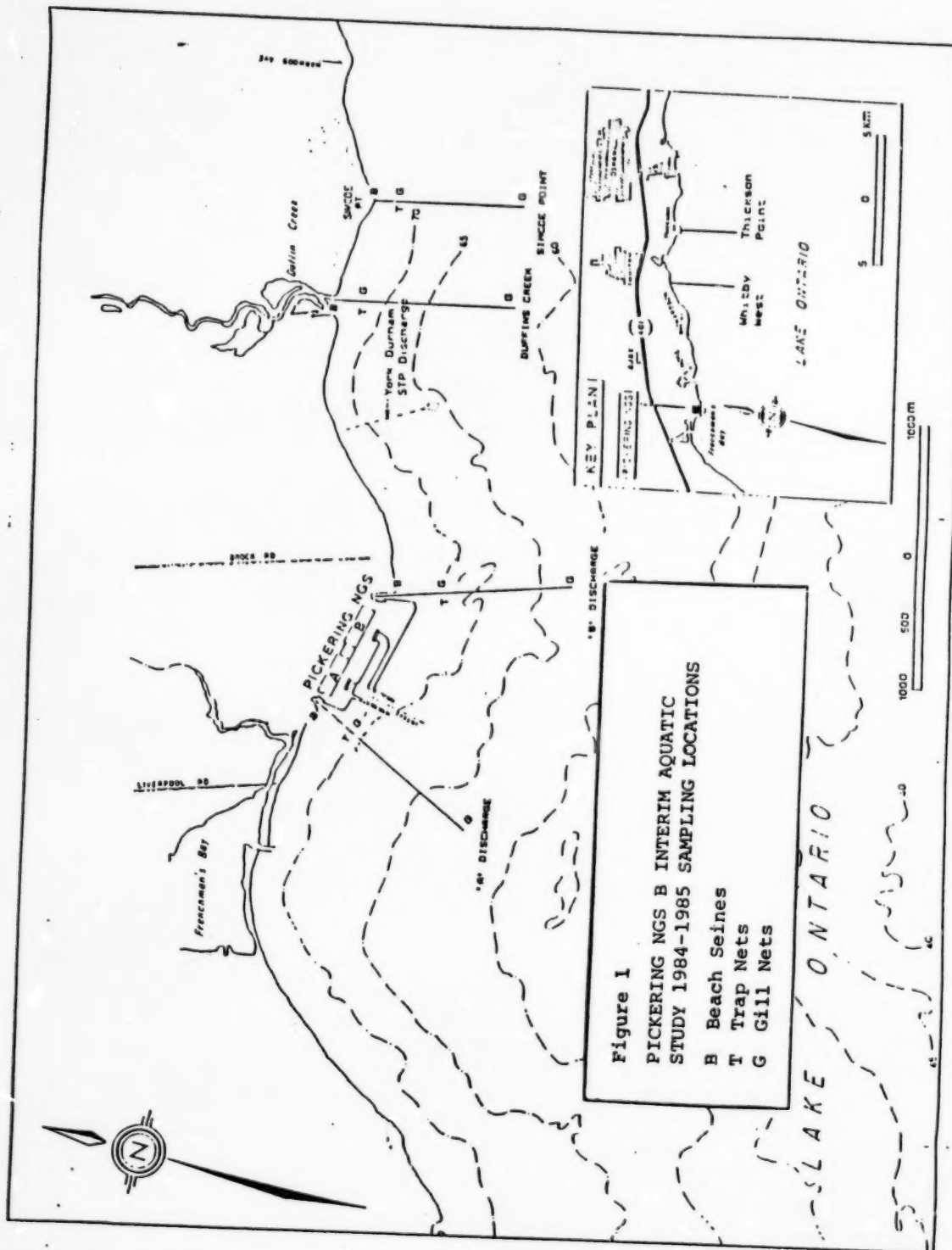
Juvenile and adult fish populations were sampled along the four Pickering NGS transects (Pickering NGS A discharge, Pickering NGS B discharge, Duffin Creek and Simcoe Point) in May, August and November of 1984 and 1985 using beach seines, trap nets and gill nets (Figure 1).

Triplicate beach seine hauls (15 m seine) were taken after dusk in May and August of 1984 and 1985. However, May 1984 samples were lost and data are therefore not available. No beach seine hauls were made in November as previous studies have demonstrated that few fish are collected by this sampling method in the study area during the fall (Ontario Hydro Research Division Report Nos 82-266-K, 82-460-K and 83-193-K).

Paired, 1.2 m trap nets were set perpendicular to shore from the 3-m depth for two consecutive 24-hour sets in May, August and November of 1984 and 1985.

Experimental gill nets consisted of eight 15 m panels with mesh size increasing in 1.3 cm increments from 3.8 to 12.7 cm. The nets were set perpendicular to shore along the bottom at the 3 and 12 m depth contour (depth of inshore end of net). The nets were set for two consecutive 24-hour sets in May, August and November of 1984 and 1985. Temperatures were recorded using a Hydrolab Digital Model 4041 probe.

All fish were identified to species and counted. Fish captured alive were released. Fork lengths and weights were recorded and



scale samples were collected for submission to the Ontario Ministry of Natural Resources to supplement their data on Lake Ontario salmonids. Round whitefish scales were used in age and growth determinations. These data are discussed in the Pickering NGS B Interim Aquatic Study: Round Whitefish Spawning Investigations - 1984/1985 report (Ontario Hydro Research Division Report in draft).

2.2 Round Whitefish Spawning Study

During the 1985 round whitefish spawning investigations, gill nets were set weekly from November 28 to December 11. Each net consisted of eight 15 m long panels with mesh size ranging from 3.8 cm to 12.7 cm in 1.3 cm increments. Nets were set along the bottom, perpendicular to shore, for a 24-hour period. During each fishing session, nets were set at depths of 3 and 7 m (depth of inshore end of the nets) along the Whitby West and Thickson Point transects. All fish captured alive were released.

3.0 RESULTS AND DISCUSSION

3.1 Water Temperature

Mean daily influent temperatures for 1984 and 1985 are presented in Figure 2. During the 1985 August fishing period, an upwelling was underway as indicated by a sharp drop in temperature in the third week. Temperatures recorded at the time gill nets were set are presented in Appendix VIII.A and results of continuous thermograph recordings are presented in Appendix VIII.B. With the exception of temperatures at the 3 m depth contour during the 1984 August and November fishing periods, bottom temperatures varied little between transects. The maximum bottom temperature difference between discharge and control transects of 7 °C was observed at the 3 m depth during the August 1984 fishing period (Appendix VIII.A).

3.2 Juvenile and Adult Fish

In this section, 1984 and 1985 fish catch are described by gear type. Complete fish catch data for beach seines are presented in Appendices I and II, for trap nets in Appendices III and IV, and for gill nets in Appendices V and VI. The common and scientific names of the fish are presented in Appendix VII.

Beach Seines

Beach seines primarily sample small fish of the shallow inshore habitat. In the Pickering NGS B study area spottail shiner (49%) was the most abundant fish taken in August 1984 beach seine hauls (Table 1), followed by longnose dace (12%) and white bass (9%). The predominance of spottail shiner was a result of relatively large catches taken at Duffin Creek (20 fish/seine, Table 2).

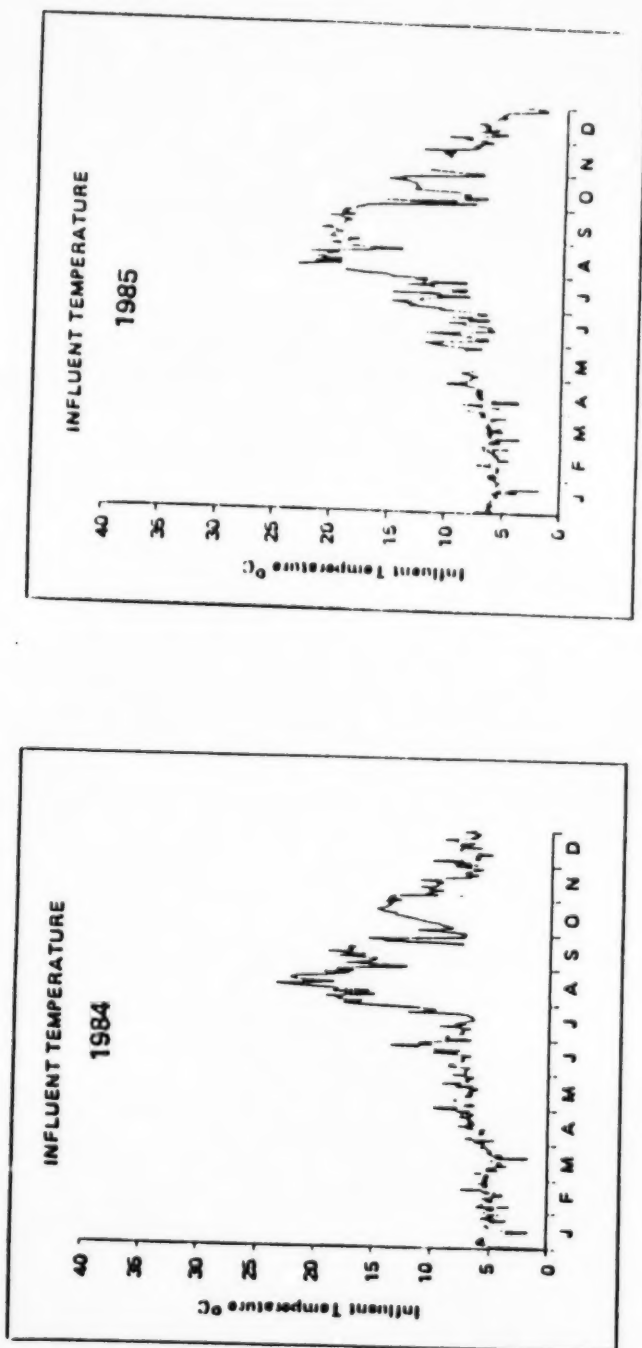


FIGURE 2
PICKERING NGS B MEAN DAILY INFLUENT TEMPERATURES 1984 AND 1985

TABLE 1

NUMBER AND PERCENT COMPOSITION () OF FISH
CAUGHT BY BEACH SEINES - PICKERING NGS B 1984

	August
Spottail Shiner	64 (48.9)
Longnose Dace	15 (11.5)
White Bass	12 (9.2)
Emerald Shiner	7 (5.3)
Alewife	6 (4.6)
Johnny Darter	6 (4.6)
Pumpkinseed	5 (3.8)
Common Shiner	4 (3.1)
Bluntnose Minnow	3 (2.3)
Gizzard Shad	2 (1.5)
Yellow Perch	2 (1.5)
White Sucker	1 (0.8)
Carp	1 (0.8)
Spotfin Shiner	1 (0.8)
Fathead Minnow	1 (0.8)
Logperch	1 (0.8)
Total	131
Catch per haul	10.9

TABLE 2
AVERAGE CATCH PER BEACH SEINE HAUL - PICKERING NGS B 1984

	PICKERING A DISCHARGE	PICKERING B DISCHARGE	DUFFIN CREEK	SIMCOE POINT
Spottail Shiner	0.3	0.7	20.3	
Longnose Dace	2.7	0.7	1.0	0.7
White Bass	2.7	0.3	0.7	0.3
Emerald Shiner		0.7	1.7	
Alewife		0.7	1.3	
Johnny Darter			1.7	0.3
Pumpkinseed	1.3	0.3		
Common Shiner			1.3	
Bluntnose Minnow			1.0	
Gizzard Shad		0.7		
Yellow Perch	0.7			
White Sucker				0.3
Carp	0.3			
Spotfin Shiner			0.3	
Fathead Minnow			0.3	
Logperch			0.3	
Total	8.0	4.0	30.0	1.6

Beach seine catch at this location was higher with a more diverse species composition than those at the remaining locations.

Beach seine hauls taken in May 1985 were dominated by rainbow smelt (50%, Table 3). Spottail shiner (35%), rainbow smelt (28%), and golden shiner (16%) were common in the August catch. More than twice as many fish were taken in August (12.9 fish/seine) than in May (5.3 fish/seine). As in 1984 larger catches with a more diverse species composition were taken at Duffin Creek than at the remaining locations (Table 4). Spottail shiner and golden shiner made up a large part of the difference between the average catch at Duffin Creek and the remaining three locations. The gradual slope of the sandy shoreline and the presence of the creek likely accounts for the larger abundances and diverse species composition of the shoreline fish community found at this location.

The average catch per beach seine haul (Table 5) was slightly lower in 1984 and 1985 than reported for the first and second interim studies conducted in 1982 (Ontario Hydro Research Division Report No 83-435-K) and 1983 (Ontario Hydro Research Division Report No 84-341-K). Some differences were also apparent in the species composition of the beach seine catch over the four years. Spottail shiner appears to have become more prominent while alewife's numerical importance declined. Golden shiner, absent from the 1982 to 1984 catches made up 11% of the 1985 catch.

Trap Nets

Trap nets sample fish of the inshore fish habitat to a depth of 3 m. Alewife (86%) was the most common fish in the 1984 trap net catch (Table 6). Most of the alewife were caught in May with the largest catch (150.8 fish/trap net) taken at the Pickering NGS B discharge (Table 7). Brown bullhead (8%) were common and were taken in largest numbers in August at the Pickering NGS A discharge (17.4 fish/trap net). White sucker and sculpin were the most common taxa in the November trap net catch and were taken in largest numbers at the Pickering NGS B discharge.

Alewife (33%), brown bullhead (29%) and white sucker (26%) were the most abundant fish in the 1985 trap net catch (Table 8). Alewife were caught in May and August with largest numbers taken at Simcoe Point (15 fish/trap net, Table 9). Brown bullhead were only caught in August and were most abundant at Duffin Creek. The largest number of white sucker were taken in May at Simcoe Point.

The trap net catch declined between 1982 and 1985 from an average catch of 118 fish/trap net to 21 fish/trap net (Table 10). The decrease in total catch was associated with lower catches of alewife. The 1985 catch was most different from those in the

TABLE 3

NUMBER AND PER CENT COMPOSITION () OF FISH CAUGHT
BY BEACH SEINES - PICKERING NGS B 1985

	MAY	AUGUST	TOTAL
Rainbow Smelt	32 (50.0)	44 (28.4)	76 (34.7)
Gizzard Shad		2 (1.3)	2 (0.9)
Yellow Perch		7 (4.5)	7 (3.2)
Longnose Dace	7 (10.9)	16 (10.3)	23 (10.5)
Spottail Shiner	8 (12.5)	54 (34.8)	62 (28.3)
Rainbow Trout	2 (3.1)		2 (0.9)
Alewife	5 (7.8)		5 (2.3)
Salmonids	5 (7.8)		5 (2.3)
White Perch		2 (1.3)	2 (0.9)
Fathead Minnow	1 (1.6)		1 (0.5)
Common Shiner	1 (1.6)		1 (0.5)
Johnny Darter	1 (1.6)		1 (0.5)
Slimy Sculpin	1 (1.6)		1 (0.5)
Logperch	1 (1.6)	4 (2.6)	5 (2.3)
Rock Bass		1 (0.6)	1 (0.5)
Golden Shiner		25 (16.1)	25 (11.4)
Total	64	155	219
Catch per haul	5.3	12.9	9.1

TABLE 4

AVERAGE CATCH PER BEACH SEINE HAUL - PICKERING NGS B 1985

	Pickering A Discharge	Pickering B Discharge	Duffin Creek	Simcoe Point
Rainbow Smelt	1.0	5.0	4.7	2.0
Gizzard Shad			0.3	
Yellow Perch		0.2	0.7	0.3
Longnose Dace	0.5	0.7	0.7	2.0
Spottail Shiner	1.3	0.2	7.5	1.3
Rainbow Trout		0.2	0.2	0.5
Alewife	0.2		0.2	
Salmonids		0.2	0.7	
White Perch			0.3	
Fathead Minnow			0.2	
Common Shiner			0.2	
Johnny Darter	0.2			
Slimy Sculpin		0.2		
Logperch		0.5	0.3	
Rock Bass			0.2	
Golden Shiner			4.2	
Total	3.2	7.0	20.2	6.2

TABLE 5

COMPARISON OF BEACH SEINE CATCH 1982-1985
Average catch and per cent composition () of fish contributing
to $\geq 0.1\%$ of total beach seine catch in at least one of the
interim study years.

	1982	1983	1984*	1985
Rainbow Smelt	6.6 (56.8)	0.5 (4.1)		3.2 (34.7)
Spottail Shiner	0.4 (3.2)	1.0 (8.1)	5.3 (48.9)	2.6 (28.3)
Alewife	2.0 (17.6)	5.6 (45.8)	0.5 (4.6)	0.2 (2.3)
White Perch	<0.1 (0.4)			<0.1 (0.9)
Gizzard Shad		<0.1 (0.7)	0.2 (1.5)	<0.1 (0.9)
Yellow Perch	0.1 (1.1)	<0.1 (0.3)	0.2 (1.5)	0.3 (3.2)
Golden Shiner				1.0 (11.4)
Longnose Dace	0.9 (7.6)	2.0 (15.9)		1.0 (10.5)
Rainbow Trout	0.3 (2.2)	<0.1 (0.3)		<0.1 (0.9)
Rock Bass				<0.1 (0.5)
Log Perch	0.3 (2.2)	0.4 (3.4)	<0.1 (0.8)	0.2 (2.3)
Salmonids				0.2 (2.3)
Slimy Sculpin	0.2 (1.4)	0.2 (1.7)		<0.1 (0.5)
Johnny Darter	<0.1 (0.4)	0.7 (5.8)	0.5 (4.6)	<0.1 (0.5)
Fathead Minnow			<0.1 (0.8)	<0.1 (0.5)
Common Shiner			0.3 (3.1)	<0.1 (0.5)
White Sucker		0.2 (1.4)	<0.1 (0.8)	
White Bass		<0.1 (0.3)	1.0 (9.2)	
Carp		<0.1 (0.3)	<0.1 (0.8)	
Longnose Sucker			1.3 (11.5)	
Pumpkinseed		0.3 (2.7)	0.4 (3.8)	
Emerald Shiner	<0.1 (0.7)	0.3 (2.7)	0.6 (5.3)	
Bluntnose Minnow		0.2 (1.4)	0.3 (2.3)	
Spotfin Shiner			<0.1 (0.8)	
Mottled Sculpin	0.1 (1.1)	<0.1 (0.3)		
Total	278	295	131	219
Average catch per haul	11.6	12.3	10.9	9.1

* August samples only.

TABLE 6

NUMBER AND PER CENT COMPOSITION () OF FISH COLLECTED IN
TRAP NETS - PICKERING NGS B 1984

	MAY	AUGUST	NOVEMBER	TOTAL
Alewife	2552 (95.8)	504 (62.5)	1 (1.1)	3057 (85.9)
Brown Bullhead	14 (0.5)	248 (30.9)	10 (11.1)	272 (7.7)
White Perch		15 (1.9)	4 (4.4)	19 (0.5)
Yellow Perch	2 (<0.1)	11 (1.4)	1 (1.1)	14 (0.4)
White Bass	7 (0.3)	6 (0.8)	1 (1.1)	14 (0.4)
Smallmouth Bass		6 (0.8)	1 (1.1)	7 (0.2)
Pumpkinseed		4 (0.5)	1 (1.1)	5 (0.1)
White Sucker	84 (3.2)	4 (0.5)	32 (35.6)	120 (3.4)
Freshwater Drum		1 (0.1)		1 (<0.1)
Black Crappie		1 (0.1)		1 (<0.1)
Rock Bass	1 (<0.1)	1 (0.1)		2 (<0.1)
American Eel		1 (0.1)		1 (<0.1)
Carp		1 (0.1)		1 (<0.1)
Sculpin		1 (0.1)	31 (34.4)	32 (<0.1)
Brown Trout	1 (<0.1)			1 (<0.1)
Rainbow Smelt	1 (<0.1)			1 (<0.1)
Round Whitefish	1 (<0.1)			1 (<0.1)
Gizzard Shad			7 (7.8)	7 (0.2)
Walleye			1 (1.1)	1 (<0.1)
Total	2663	804	90	3557
Catch per trap net	166.4	50.3	5.6	74.1

TABLE 7
AVERAGE CATCH PER TRAP NET ALONG FOUR TRANSECTS
- PICKERING NGS B 1984

	PICKERING A DISCHARGE	PICKERING B DISCHARGE	DUFFIN CREEK	SIMCOE POINT
Alewife	25.3	150.8	72.8	5.9
Brown Bullhead	17.4	1.3	0.3	3.7
White Perch	1.3	0.3		
Yellow Perch	0.2	0.6	0.2	0.3
White Bass	0.4	0.5	0.3	
Smallmouth Bass	0.4	0.1		0.1
Pumpkinseed	0.2		0.3	
White Sucker	0.8	5.3	2.4	1.3
Freshwater Drum		0.1	0.1	0.1
Black Crappie	0.1			
Rock Bass	0.2			
American Eel		0.1		
Carp	0.3	2.3	0.1	0.1
Sculpin				0.1
Brown Trout	0.1			
Rainbow SMelt		0.1		
Round Whitefish				0.1
Gizzard Shad		0.3	0.1	0.2
Walleye		0.1		
Total	46.6	161.8	76.4	11.7

TABLE 8

NUMBER AND PER CENT COMPOSITION () OF FISH COLLECTED IN
TRAP NETS - PICKERING NGS B 1985

	May	August	November	Total
Alewife	173 (41.5)	159 (33.5)		332 (32.9)
White Sucker	219 (52.5)	1 (0.2)	37 (31.4)	257 (25.5)
Brown Bullhead		278 (58.7)	13 (11.0)	291 (28.8)
Rainbow Smelt	3 (0.7)	3 (0.6)		6 (0.6)
White Perch	1 (0.2)	4 (0.8)	17 (14.4)	22 (2.2)
White Bass	1 (0.2)	10 (2.1)	37 (31.4)	48 (4.8)
Gizzard Shad		1 (0.2)		1 (0.1)
Yellow Perch	5 (1.2)	9 (1.9)	2 (1.7)	16 (1.6)
Longnose Sucker	11 (2.6)			11 (1.1)
Carp		3 (0.6)	4 (3.4)	7 (0.7)
Smallmouth Bass		2 (0.4)	2 (1.7)	4 (0.4)
Pumpkinseed		1 (0.2)	5 (4.2)	6 (0.6)
Rock Bass	3 (0.7)			3 (0.3)
American Eel	1 (0.2)	3 (0.6)		4 (0.4)
Walleye			1 (0.9)	1 (0.1)
Goldfish			1 (0.9)	1 (0.1)
Total	417	474	119	1010
Catch per trap net	26.1	29.6	7.4	63.1

TABLE 9

AVERAGE CATCH PER TRAP NET ALONG FOUR TRANSECTS
- PICKERING NGS B 1985

	PICKERING A DISCHARGE	PICKERING B DISCHARGE	DUFFIN CREEK	SIMCOE POINT
Alewife	4.3	1.2	7.2	15.0
White Sucker	3.4	0.6	4.1	13.3
Brown Bullhead	0.5	6.3	10.5	6.9
Rainbow Smelt		0.2	0.3	
White Perch	1.1	0.3	0.3	0.3
White Bass	1.3	1.6	1.0	0.1
Gizzard Shad			0.1	
Yellow Perch	0.3	0.6	0.1	0.4
Longnose Sucker			0.1	0.9
Carp	0.3		0.2	0.1
Smallmouth Bass	0.1	0.2	0.1	
Pumpkinseed	0.2	0.1	0.3	
Rock Bass	0.1	0.1		0.1
American Eel	0.1	0.1	0.2	
Walleye	0.1			
Goldfish			0.1	
Total	11.8	11.1	24.3	37.1

TABLE 10

COMPARISON OF TRAP NET CATCH 1982-1985

Average catch and per cent composition () of fish contributing to $\geq 0.1\%$ of total trap net catch in at least one of the interim study years.

	1982	1983	1984	1985
	Per Cent Composition			
Alewife	100.8 (85.4)	72.8 (79.3)	63.7 (85.9)	6.9 (32.9)
White Sucker	4.6 (3.9)	3.6 (3.9)	2.5 (3.4)	5.4 (25.5)
Brown Bullhead	7.4 (6.3)	13.5 (14.7)	5.4 (7.7)	6.0 (28.8)
Rainbow Smelt	2.2 (1.9)	<0.1 (<0.1)	<0.1 (<0.1)	0.1 (0.6)
White Perch	1.1 (0.9)	0.6 (0.6)	0.4 (0.5)	0.5 (2.2)
White Bass	0.5 (0.4)	<0.1 (0.1)	0.3 (0.4)	1.0 (4.8)
Gizzard Shad	<0.1 (<0.1)	<0.1 (<0.1)		
Yellow Perch	0.8 (0.7)	0.3 (0.3)	0.3 (0.4)	0.3 (1.6)
Longnose Sucker	<0.1 (<0.1)			0.2 (1.1)
Carp	0.2 (0.2)	0.4 (0.4)	0.7 (0.9)	0.1 (0.7)
Smallmouth Bass	<0.1 (<0.1)	0.2 (0.2)	0.2 (0.2)	<0.1 (0.4)
Pumpkinseed		<0.1 (<0.1)	<0.1 (0.1)	0.1 (0.6)
Rock Bass	0.2 (0.2)	<0.1 (0.1)	<0.1 (0.1)	<0.1 (0.3)
American Eel	<0.1 (<0.1)	<0.1 (<0.1)	<0.1 (<0.1)	<0.1 (0.1)
Walleye	<0.1 (<0.1)	<0.1 (<0.1)	<0.1 (<0.1)	<0.1 (0.1)
Goldfish				<0.1 (0.1)
Total number	5665	4404	3557	1010
Avg catch per trap net	118.0	91.8	74.1	21.0

three previous years with a drop in the prominence of alewife and an increase in the numerical importance of white sucker and brown bullhead.

Gill Nets

The gill nets sampled the bottom fish community from a depth of 3 m to the 12 - 13 m depth. Alewife (86%) was the most abundant species in the 1984 gill net catch and dominated the catch in all three fishing periods (Table 11). They were taken in highest numbers in May with substantially lower numbers taken in November. The alewife were more abundant offshore at the 12 m depth than at 3 m and were most abundant at Duffin Creek (Table 12). Of the remaining species, white sucker (4%), gizzard shad (2%) and lake trout (2%) were among the more common. A larger number of white sucker were taken at the Pickering NGS B discharge and at Duffin Creek than at the remaining two locations. Gizzard shad catch was highest at the Pickering NGS A discharge while lake trout catch was lowest at this location and highest at Simcoe Point.

Alewife was also the most abundant species taken in the 1985 gill nets (Table 13) and numerically dominated the May and August catches. Largest numbers were taken in May. During the 1982 and 1983 interim studies, alewife were also most abundant in May. This seasonality reflects their annual migration within Lake Ontario where they move inshore in April and migrate to deeper waters in late August after spawning (Graham, 1957). The gill net catch of alewife did not vary much with location in 1985 (Table 14).

White sucker (7%) and lake trout (2%) were among the more common of the remaining species taken by gill net in 1985. Average gill net catch of white sucker was slightly higher at Duffin Creek than at the remaining transects. As in 1984, lake trout were taken in increasing numbers from the west (Pickering NGS A) to the east (Simcoe Point) of the study area.

White perch and white bass only make up a small part of the total gill net catch in each of the two years. Both these species were more abundant at the Pickering NGS A discharge than at the remaining locations. During the Pickering NGS B preoperational study (Ontario Hydro Research Division Report No 84-135-K) and the 1982 interim study (Ontario Hydro Research Division Report No 83-435-K), white perch and white bass were also found in highest abundances at the Pickering NGS A discharge. White perch were also more abundant at this location during the 1983 interim study (Ontario Hydro Research Division Report No 84-341-K).

Low temperatures prevailed during the 1985 August fishing period as a result of upwelling (Figure 2). Consequently cold-water species that are generally absent or present in very low numbers

TABLE 11
NUMBER AND PER CENT COMPOSITION () OF FISH CAUGHT IN GILL NETS

PICKERING NGS B 1984

	May		August		November		Total
	3M	12M	3M	12M	3M	12M	
Alewife	2233 (89.3)	3088 (87.5)	440 (56.9)	1841 (87.7)	75 (18.1)	425 (81.0)	8102 (85.6)
White Sucker	29 (1.2)	12 (0.4)	68 (8.2)	170 (8.1)	99 (23.9)	39 (7.4)	417 (4.4)
Gizzard Shad	1 (0.1)		132 (15.9)	1 (<0.1)	65 (15.7)		199 (2.1)
Lake Trout	45 (1.9)	41 (1.3)			61 (14.7)	9 (1.7)	156 (1.6)
Rainbow Smelt	28 (1.2)	59 (1.8)		26 (1.2)	2 (0.5)	8 (1.5)	123 (1.3)
Brown Trout	15 (0.6)	3 (0.1)		30 (1.4)	35 (8.5)	9 (1.7)	92 (1.0)
White Bass	2 (0.1)	5 (0.2)	62 (7.5)		5 (1.2)	1 (0.2)	75 (0.8)
Yellow Perch	8 (0.3)	2 (0.1)	37 (4.5)	1 (<0.1)	24 (5.8)	1 (0.2)	73 (0.8)
Round Whitefish	9 (0.4)	6 (0.2)		7 (0.3)	19 (4.6)	23 (4.4)	64 (0.7)
Brown Bullhead	2 (0.1)		44 (5.3)	1 (<0.1)	1 (0.2)		48 (0.5)
Rainbow Trout	1 (<0.1)	1 (<0.1)	13 (1.6)	19 (0.9)	4 (1.0)	1 (0.2)	39 (0.4)
White Perch	2 (0.1)		4 (0.5)	1 (<0.1)	15 (3.6)	4 (0.8)	26 (0.3)
Smallmouth Bass	1 (<0.1)		11 (1.3)		1 (0.2)		13 (0.1)
Carp			9 (1.1)		3 (0.7)		12 (0.1)
Longnose Sucker	1 (<0.1)		5 (0.6)	2 (0.1)			8 (0.1)
Lake Whitefish					2 (0.5)	2 (0.4)	4 (0.1)
Coho Salmon						3 (0.6)	3 (0.1)
Quillback			3 (0.4)				3 (0.1)
Walleye			1 (0.1)		1 (0.2)		2 (0.1)
Lake Chub			1 (0.1)	1 (<0.1)			2 (0.1)
Rock Bass							2 (0.1)
Freshwater Drum					1 (0.2)		1 (0.1)
Chinook Salmon	1 (<0.1)	1 (0.1)			1 (0.2)		1 (0.1)
Total	2378	3218	830	2100	414	525	9465
Catch per net	297.3	402.3	103.8	262.5	51.8	65.6	197.2

TABLE 12

AVERAGE FISH CATCH PER GILL NET - PICKERING NGS B 1984

	PICKERING A DISCHARGE	PICKERING B DISCHARGE	DUFFIN CREEK	SIMCOE POINT
Alewife	138.1	129.8	244.1	169.7
White Sucker	5.1	11.4	10.8	7.4
Brown Bullhead	0.3		1.3	2.3
Gizzard Shad	6.2		5.4	0.6
Lake Trout	2.2	3.1	3.2	4.6
Rainbow Smelt	2.8	3.4	3.3	0.7
White Bass	3.1	0.1	1.9	1.2
Brown Trout	3.9	1.8	1.0	0.9
Yellow Perch	1.3	1.5	2.8	0.5
Round Whitefish	2.3	0.6	2.0	0.4
White Perch	1.3	0.6	0.3	
Carp			0.9	
Rainbow Trout	0.7	1.8	0.5	0.2
Longnose Sucker		0.2	0.4	0.1
Smallmouth Bass	0.6		0.2	0.3
Rock Bass	0.1	0.1		
Lake Whitefish	0.1			0.3
Walleye			0.1	0.1
Lake Chub			0.2	
Quillback			0.3	
Coho Salmon	0.1	0.1	0.1	
Freshwater Drum			0.1	
Chinook Salmon			0.1	
Total Catch per gill net	168.2	154.5	278.9	189.2

TABLE 13

NUMBER AND PER CENT COMPOSITION () OF FISH CAUGHT IN GILL NETS

PICKERING NGS B 1985

	May		August		November		Total
	3M	12M	3M	12M	3M	12M	
Alewife	2195 (87.2)	1863 (92.8)	430 (63.0)	1065 (84.7)	2 (1.2)	15 (12.2)	5570 (82.5)
White Sucker	194 (7.7)	75 (3.7)	93 (13.6)	16 (1.3)	40 (24.5)	33 (26.8)	451 (6.7)
Lake Trout	23 (0.9)	35 (1.7)	13 (1.9)	65 (5.2)	14 (8.6)	10 (8.1)	160 (2.4)
Round Whitefish	3 (0.1)	6 (0.3)		12 (1.0)	28 (17.2)	52 (42.3)	101 (1.5)
Brown Trout	30 (1.2)	4 (0.2)	14 (2.1)	15 (1.2)	33 (20.3)	4 (3.3)	100 (1.5)
White Perch	18 (0.7)	1 (<0.1)	29 (4.3)		25 (15.3)	8 (6.5)	81 (1.2)
Rainbow Smelt	4 (0.2)	13 (0.6)	3 (0.4)	48 (3.8)	2 (1.2)		70 (1.0)
Brown Bullhead	1 (<0.1)		44 (6.4)				45 (0.7)
Coho Salmon			10 (1.5)	31 (2.5)	1 (0.6)		42 (0.6)
Gizzard Shad	17 (0.7)		19 (2.8)	1 (<0.1)	3 (1.8)		40 (0.6)
White Bass	22 (0.9)	7 (0.4)	3 (0.4)		2 (1.2)		34 (0.5)
Yellow Perch	1 (<0.1)		8 (1.2)	1 (<0.1)	2 (1.2)		12 (0.2)
Carp	1 (<0.1)		7 (1.0)		2 (1.2)		10 (0.1)
Longnose Sucker	7 (0.3)	1 (0.1)					8 (0.1)
Lake Whitefish		2 (0.1)		3 (0.2)	1 (0.6)		6 (0.1)
Smallmouth Bass			6 (0.9)				6 (0.1)
Rainbow Trout					5 (3.1)		5 (0.1)
Northern Pike			1 (0.2)		3 (1.8)		4 (0.1)
Walleye	1 (<0.1)		1 (0.2)				2 (<0.1)
Lake Chub						1 (0.8)	1 (<0.1)
Rock Bass			1 (0.2)				1 (<0.1)
Sculpin			1 (0.2)				1 (<0.1)
Total	2517	2007	683	1257	163	123	6750
Catch per gill net	314.6	250.9	85.4	157.1	20.4	15.4	140.6

TABLE 14

AVERAGE FISH CATCH PER GILL NET - PICKERING NGS B 1985

	Pickering A Discharge	Pickering B Discharge	Duffin Creek	Simcoe Point
Alewife	107.1	120.3	117.8	120.7
White Sucker	6.4	5.5	15.8	10.3
Brown Bullhead	0.8	2.4	0.1	0.4
Gizzard Shad	1.3	0.4	1.0	0.7
Lake Trout	2.0	3.3	2.9	4.4
Rainbow Smelt	2.3	1.3	1.5	0.8
White Bass	2.1	0.2	0.4	0.2
Brown Trout	2.3	2.7	1.6	1.1
yellow Perch	0.2	0.4	0.4	
Round Whitefish	1.6	2.3	3.4	1.3
White Perch	3.0	2.7	0.7	0.4
Carp	0.5		0.1	0.3
Rainbow Trout		0.2	0.2	0.1
Longnose Sucker	0.1		0.3	0.3
Smallmouth Bass	0.3	0.2		
Rock Bass				0.1
Lake Whitefish	0.3	0.3		
Walleye	0.1	0.1		
Lake Chub				0.1
Coho Salmon	1.0	0.3	1.8	0.4
Northern Pike	0.1			
Sculpin	0.1	0.2	0.1	
Total catch per gill net	131.5	142.5	148.1	141.3

in the study area in August were caught in relatively high numbers in August of 1985. These species included lake trout, coho salmon, round whitefish and lake whitefish.

Gill net catches during the August and November 1984 fishing periods, when bottom temperatures were most different between transects (Appendix VIII.A), were not obviously related to temperature with one exception: a substantially larger catch (59 fish) of gizzard shad was taken in the 3 m nets at the Pickering NGS A discharge in November. During the Pickering NGS B preoperational study (Ontario Hydro Research Division Report No 84-135-K) highest numbers of gizzard shad were caught at the Pickering NGS A discharge in October of each year. They were also found to show a preference for this location during the Pickering NGS A postoperational study in 1974-1976 (Ontario Hydro Research Division Report No 80-226-K).

The 1984 gill net catch was higher than those of the remaining years of interim studies, while the 1985 catch was lowest (Table 15). The differences in total catch were mainly due to differences in the alewife catch with largest numbers of alewife taken in 1984 and lowest in 1985. The composition of the gill net catch was most different in 1982 when the average catch and relative abundance of alewife were lower than in the remaining years and those of rainbow smelt were somewhat higher. The average catch of rainbow smelt dropped from 23.5 to 1.4 fish per net over the four-year period while those of lake trout and brown trout increased from 0.9 to 3.4 and 0.8 to 2.1 respectively. The average catches of lake trout and brown trout were 0 or 0.1 fish per net during the 1979-1981 preoperational studies. The increase in numbers of lake trout and brown trout in the study area is a result of a steady increase in the stockings of these species initiated in 1972-1973 (Ontario Ministry of Natural Resources unpublished data).

The mean weight of lake trout taken in gill nets in 1984 was 2.3 kg (N = 101, SD = 0.96 kg) and of those taken in 1985 was 2.8 kg (N = 64, SD = 0.95 kg). The mean biomass of brown trout was 1.7 kg (N = 52, SD = 1.0) in 1984 and 2.6 kg (N = 61, SD = 1.6) in 1985.

Although alewife occurred in considerably higher numbers than lake trout, their total biomass in the 1984 and 1985 gill net catches were only slightly higher than those of lake trout. Assuming a mean weight of 30 g for alewife (Ontario Hydro Research Division Report No 80-382-K) the total biomass of alewife caught in the gill nets in 1984 would be 251 kg and for those caught in 1985 it would be 167.1 kg. Using mean weights of lake trout caught during the 1984 and 1985 gill netting programs, its total biomass was estimated at 232 and 154 kg, respectively. With a further increase in average catch, lake trout may soon dominate in terms of biomass.

TABLE 15

COMPARISON OF GILL NET CATCH 1982-1985

Average catch and per cent composition () of fish contributing to
>0.1% of the total gill net catch in at least one of the
 interim study years.

	1982	1983	1984	1985
	Per Cent Composition			
Alewife	87.4 (68.3)	137.2 (84.4)	168.8 (85.6)	116.1 (82.6)
White Sucker	9.3 (7.3)	6.5 (4.0)	8.7 (4.4)	9.4 (6.7)
Brown Bullhead	<0.1 (<0.1)	10.3 (0.2)	1.0 (0.5)	1.0 (0.7)
Gizzard Shad	1.0 (0.8)	3.6 (2.2)	4.1 (2.1)	0.8 (0.6)
Lake Trout	0.9 (0.7)	2.1 (1.3)	3.2 (1.6)	3.4 (2.4)
Rainbow Smelt	23.5 (18.4)	6.3 (3.9)	2.6 (1.3)	1.4 (1.0)
White Bass	1.5 (1.2)	0.2 (0.1)	1.6 (0.8)	0.7 (0.5)
Brown Trout	0.8 (0.6)	1.6 (1.0)	2.0 (1.0)	2.1 (1.5)
Yellow Perch	0.3 (0.2)	1.5 (0.9)	1.6 (0.8)	0.3 (0.2)
Round Whitefish	1.3 (1.0)	1.1 (0.7)	1.4 (0.7)	2.1 (1.5)
White Perch	<0.1 (<0.1)	1.0 (0.6)	0.6 (0.3)	1.7 (1.2)
Carp	<0.1 (<0.1)	0.1 (<0.1)	0.2 (0.1)	
Rainbow Trout	<0.1 (<0.1)	0.3 (0.2)	0.8 (0.4)	
Smallmouth Bass		0.2 (0.1)	0.2 (0.1)	
Longnose Sucker	0.3 (0.2)	<0.1 (<0.1)	0.2 (0.1)	
Coho Salmon	0.3 (0.2)	<0.1 (<0.1)	<0.1 (<0.1)	
Chinook Salmon	0.3 (0.2)	<0.1 (<0.1)	<0.1 (<0.1)	
Lake Whitefish	0.1 (0.1)	0.2 (0.1)	<0.1 (<0.1)	
Total Number	6139	7802	9465	6750
Avg Catch per gill net	127.9	162.5	197.2	140.6

3.3 1985 Round Whitefish Spawning Study

A total of 229 fish were caught in 12 gill nets set at Whitby West and Thickson Point between November 29 and December 11, 1985 (Table 16). Round whitefish was the most common species with 110 fish making up 48% of the catch. White sucker was the second most abundant (27%) followed by brown trout (9%). A slightly higher number of round whitefish were taken at Whitby West (7.3 fish/net) than at Thickson Point (6.5 fish/net). With the exception of Thickson Point on December 12, larger numbers were taken at 7 m than at 3 m. During the round whitefish studies conducted in 1982, 1983, and 1984 (Ontario Hydro Research Division Report No 83-435-K, 83-341-K, and draft report), larger numbers were caught at Thickson Point with higher catches at 7 m than at 3 m.

The two largest single catches of round whitefish were taken in the Whitby West (22 fish/net) and Thickson Point (23 fish/net) 7 m nets on December 4. Largest single net catches in the 1981 through 1984 studies were taken during the December 3 to 11 period.

The average catch of round whitefish has increased in the last two years. Average catch of round whitefish in 1985 was 8.4 fish/net. Average catch in 1984 for nets set at the two transects between November 27 and December 11, a comparable study period, was 6.4 fish/net. At 6.1, the average catch for the 1984 November 20 to December 11 period was higher than those recorded for the same periods in 1982 (3.3 fish/net) and 1983 (3.8 fish/net).

The age structure of the round whitefish collected in 1985 is discussed in the report on the 1984-1985 round whitefish spawning investigations (in draft). In 1985 the 4+ group was most common making up 57% of the fish collected in the area between the Pickering A discharge in the west to Thickson Point in the east.

4.0 SUMMARY

Spottail shiner was the most abundant species taken by beach seine in 1984 while rainbow smelt was the most abundant in the 1985 catch. Largest beach seine catches were taken at Duffin Creek in both years. Average beach seine catch was lower in 1984 and 1985 than in 1982 and 1983.

Alewife was the most common species taken by trap net in both years. Trap net catch was highest at the Pickering NGS B discharge in 1984 and at Simcoe Point in 1985. Average trap net catch declined between 1982 and 1985 because of lower catches of alewife.

TABLE 16

PICKERING ROUND WHITEFISH 1985

	NOVEMBER 29				DECEMBER 4				DECEMBER 12				TOTAL % OF Catch Catch	
	Whitby W		Thickson		Whitby W		Thickson		Whitby W		Thickson			
	3m	7m	3m	7m	3m	7m	3m	7m	3m	7m	3m	7m		
Round Whitefish	5	15		1	1	22	3	23	6	9	14	11	110	48.03%
White Sucker	13	9		1	17	5	2	4	1		3	4	61	26.64%
Brown Trout	3	2	1			6	1	2	2		2	1	20	8.73%
Rainbow Trout	1	3	4						1		1		10	4.37%
Carp	1		1		1	1	2						6	2.62%
Lake Trout				3	1								4	1.75%
Alewife				4									4	1.75%
White Bass						1					1	1	3	1.31%
White Perch	1					1			1				3	1.31%
Yellow Perch				1	1				1				3	1.31%
Gizzard Shad			1				1						2	0.87%
Lake Whitefish							1	1					2	0.87%
Redhorse Sucker									1				1	0.44%
Total	24	29	9	10	21	36	10	30	13	9	21	17	229	

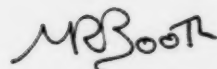
Alewife was also numerically dominant in the gill net catches in both years. Gill net catch was highest at Duffin Creek in both years. Average gill net catch was higher in 1984 than in the remaining years of interim studies and lowest in 1985.

Round whitefish was the most common species taken during the round whitefish spawning study with higher numbers caught at Whitby West than at Thickson Point. The average catch of round whitefish during the fall of 1985 was higher than those recorded in previous years.

ACKNOWLEDGEMENT

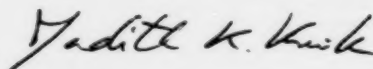
The 1984 study was planned and carried out under the coordination of W.E. Carey and the 1985 study was planned and carried out under the coordination of R.W. Sheehan. The authors wish to acknowledge their contributions to the project. Thanks are also due to D. Lowther and O. Turczyn for involvement in the field program.

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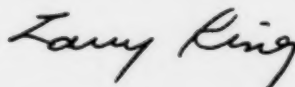


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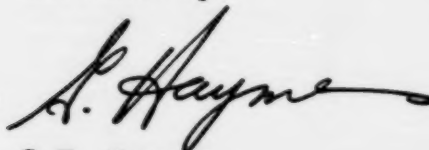


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APPENDIX I

PICKERING BEACH SEINES 1984

AUGUST 1984	PICKERING A DISCHARGE	PICKERING B DISCHARGE	DUFFIN CREEK	SIMCOE POINT	TOTAL	% CATCH
Alewife		2	4		6	4.58%
Gizzard Shad		2			2	1.53%
White Sucker				1	1	0.76%
Carp	1				1	0.76%
Spottail Shiner	1	2	61		64	48.85%
Emerald Shiner		2	5		7	5.34%
Bluntnose Minnow			3		3	2.29%
Spotfin Shiner			1		1	0.76%
Fathead Minnow			1		1	0.76%
Common Shiner			4		4	3.05%
Longnose Dace	8	2	3	2	15	11.45%
Pumpkinseed	4	1			5	3.82%
Yellow Perch	2				2	1.53%
Logperch			1		1	0.76%
Johnny Darter			5	1	6	4.59%
White Bass	8	1	2	1	12	9.16%
Total	24	12	90	5	131	100.00%

APPENDIX II

PICKERING BEACH SEINES 1985

MAY 1985

	PICKERING A DISCHARGE	PICKERING B DISCHARGE	DUFFIN CREEK	SIMCOE POINT	TOTAL	% CATCH
Smelt	6	4	10	12	32	50.00%
Spottail Shiner	8				8	12.50%
Longnose Dace	2	4		1	7	10.94%
Salmonids		1	4		5	7.81%
Alewife	1		1	3	5	7.81%
Rainbow Trout		1	1		2	3.13%
Johnny Darter	1				1	1.56%
Slimy Sculpin		1			1	1.56%
Logperch			1		1	1.56%
Common Shiner			1		1	1.56%
Fathead Minnow			1		1	1.56%
Total	18	11	19	16	64	100.00%

AUGUST 1985

	PICKERING A DISCHARGE	PICKERING B DISCHARGE	DUFFINS CREEK	SIMCOE POINT	TOTAL	% CATCH
Spottail Shiner		1	45	8	54	34.84%
Smelt		26	18		44	28.39%
Golden Shiner			25		25	16.13%
Longnose Dace	1		4	11	16	10.32%
Yellow Perch		1	4	2	7	4.52%
Logperch		3	1		4	2.58%
Gizzard Shad			2		2	1.29%
White Perch			2		2	1.29%
Rock Bass			1		1	0.65%
Total	1	31	102	21	155	100.00%

APPENDIX III

PICKERING TRAP NETS 1984 MAY

MAY 1984	PICKERING A DISCHARGE						PICKERING B DISCHARGE						DUFFIN CREEK						SIMCOE POINT						TOTAL E	TOTAL W	TOTAL #	% CATCH
	EAST			WEST			EAST			WEST			EAST			WEST			EAST			WEST						
	17	19	17	19	17	19	17	19	17	18	17	18	17	19	17	18	17	19	17	19	17	19						
Alewife	16	10	192	74	323	1214	137	71	73	180	62	130	7	13	37	13	1836	716	2552	95.83%								
White Sucker	2				8	8	1	22	10	14	1	3	5	7	1	2	54	30	84	3.15%								
Brown Bullhead																												
White Bass	1									3			3	6	2	2	12	2	14	0.53%								
Yellow Perch		1	1		2	2	3	3				1					3	4	7	0.20%								
Brown Trout	1																1	1	2	0.08%								
Rock Bass	1																1	1	1	0.04%								
Seelt																	1	1	1	0.04%								
Round Whitefish						1											1	1	1	0.04%								
TOTAL	21	11	193	74	331	1225	138	96	83	197	63	134	15	27	38	17	1910	753	2663	100.00%								

APPENDIX III (Cont'd)

PICKERING TRAP NETS 1984
AUGUST

	PICKERING A DISCHARGE						PICKERING B DISCHARGE						DUFFIN CREEK						SIMCOE POINT						TOTAL E	TOTAL W	TOTAL #	% CATCH																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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APPENDIX III (Cont'd)
PICKERING TRAP NETS 1984
NOVEMBER

NOVEMBER 1984	PICKERING A DISCHARGE						PICKERING B DISCHARGE						DUFFIN CREEK						SIMCOE POINT						TOTAL E	TOTAL W	TOTAL #	% CATCH																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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APPENDIX IV

PICKERING TRAP NET DATA 1985 MAY 23 AND 24, 1985

MAY	PICKERING A DISCHARGE				PICKERING B DISCHARGE				DUFFIN CREEK				SIMCOE POINT				TOTAL E	TOTAL W	TOTAL #	% CATCH	
	EAST		WEST		EAST		WEST		EAST		WEST		EAST		WEST						
	23	24	23	24	23	24	23	24	23	24	23	24	23	24	23	24					
White Sucker	1	21	14	5													96	123	219	52.52%	
Alewife	7	4	39	2		1	3	4		3	7	5			1	80	1	33	140	41.49%	
Longnose Sucker						7					3	11				6	1	3	8	11	2.64%
Yellow Perch	1				1						1				2	1	4	1	5	1.20%	
Smelt						1		1			1						1	2	3	0.72%	
Rock Bass			1				1								1			3	3	0.72%	
White Bass																1		1	1	0.24%	
White Perch															1			1	1	0.24%	
American Eel			1															1	1	0.24%	
Total	9	25	55	7	1	9	4	5	0	3	12	16	35	55	175	6	137	280	417	100.00%	

APPENDIX IV (Cont'd)

PICKERING TRAP NET DATA 1985 AUGUST 13 AND 24, 1985

AUGUST	PICKERING A DISCHARGE				PICKERING B DISCHARGE				DUFFIN CREEK				SIMCOE POINT				TOTAL E	TOTAL W	TOTAL #	% CATCH
	EAST		WEST		EAST		WEST		EAST		WEST		EAST		WEST					
	13	14	13	14	13	14	13	14	13	14	13	14	13	14	13	14				
Brown Bullhead					46	14	14	1	107	7	2	4	1	2	4	76	177	101	278	58.65%
Alewife					3				69		3					68	72	87	159	33.54%
White Bass					3		7										3	7	10	2.11%
Yellow Perch				1	2	1	2		1				1	1			6	3	9	1.90%
White Perch	1				1												2	2	4	0.84%
Carp									1	1					1		2	1	3	0.63%
American Eel					1				2								3		3	0.63%
Saelt									3								3		3	0.63%
Smallmouth Bass					1		1										1	1	2	0.42%
Gizzard Shad										1							1		1	0.21%
Pumpkinseed					1												1		1	0.21%
White Sucker							1										1	1	1	0.21%
TOTAL	1	0	0	1	58	15	25	1	183	9	5	4	2	3	21	146	271	203	474	100.00%

APPENDIX IV (Cont'd)

PICKERING TRAP NET DATA 1985 NOVEMBER 12 AND 15, 1985

NOVEMBER	PICKERING A DISCHARGE						PICKERING B DISCHARGE						DUFFIN CREEK						SIMCOE POINT					TOTAL E	TOTAL W	TOTAL #	% CATCH
	EAST			WEST			EAST			WEST			EAST			WEST			EAST	WEST	EAST	WEST					
	12	13	14	12	13	14	13	14	15	13	14	15	13	14	15	13	14	15									
White Bass	2				14	8	2	6	3	1									19			18		37	31.36%		
White Sucker						2	2	8	5	21									10		1	27		37	31.36%		
White Perch	3			2	7	2	2			1									7			10		17	14.41%		
Brown Bullhead	4	1			1	1	2			2									8			5		13	11.02%		
Pumpkinseed	1	1					2	1		2									3			2		5	4.24%		
Carp	3				1														3			1		4	3.39%		
Smallmouth Bass	1					1													1			1		2	1.69%		
Yellow Perch								1											2					2	1.69%		
Goldfish																			1					1	0.85%		
Walleye	1																		1					1	0.85%		
TOTAL	15	3	2	2	23	8	7	0	0	6	16	10	28	0	0	0	0	1	55			64		119	100.00%		

APPENDIX V
PICKERING GILL NETS
MAY 8, 11 & 15, 1984

MAY	PICKERING A DISCHARGE						PICKERING B DISCHARGE						DUFFIN CREEK						SIMCOE POINT						TOTAL 12M	TOTAL CATCH	% OF CATCH
	10	11	11	15	12M	3M	10	11	15	12M	3M	10	11	15	12M	3M	11	15	12M	3M							
Alewife	259	247	543	317	87	16	434	343	510	109	471	419	620	385	508	53	2233	3088	5321	95.09%							
Smelt			4	5			23	11	25	11	1	1		3	2	2	28	59	87	1.55%							
Lake Trout	4	4	7	3			4	6	4	5	5	10	4	24	5	1	45	41	86	1.54%							
White Sucker	7	2	1	3		1			10	1	1	6	4	4	1		29	12	41	0.73%							
Brown Trout	7	4						2	2	1	1	1	1	1	0		15	3	18	0.32%							
Round Whitefish		1	1	4		2			4	1	1	1		1	1		9	6	15	0.27%							
Yellow Perch	3	2	1							2				1	2	1	8	2	10	0.18%							
White Bass		1	1											1	1		2	5	7	0.13%							
Rainbow Trout	1														1		1	1	2	0.04%							
Rock Bass		1						1									1	1	2	0.04%							
White Perch	2																2			0.04%							
Brown Bullhead	1													1			2		2	0.04%							
Smallmouth Bass	1																2		2	0.04%							
Longnose Sucker													1				1		1	0.02%							
Gizzard Shad															1		1		1	0.02%							
Total	285	262	558	332	87	20	463	361	530	143	488	440	629	422	519	57	2378	3218	5596	100.00%							

PICKERING GILL NETS
AUGUST 14 & 15, 1984

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APPENDIX V (Cont'd)

PICKERING GILL NETS
NOVEMBER 6 & 7

NOVEMBER	PICKERING A DISCHARGE						PICKERING B DISCHARGE						DUFFIN CREEK						SIMCOE POINT						TOTAL 12M	TOTAL CATCH	% OF CATCH
	3M	7	6	12M	7	6	3M	7	6	12M	7	6	3M	7	6	12M	7	6	3M	7	6	12M					
Alewife	6		231	11	2	67	7	34	13	57	20	15	5	14	18								425	500	53.25%		
White Sucker	1	1	7	5	24	6	3	5	12	7	5	8	8	5	1	99						39	138	14.70%			
Lake Trout	4	1			17	7	2	1	5	8	1	12	7	2	61							9	70	7.45%			
Gizzard Shad	59																										
Brown Trout	2	2	6	1	8	5	1	1	4	5						65						9	44	4.69%			
Round Whitefish	3	2	3	7	2	3		1	5	6	6	5	1	2	1	35						23	42	4.47%			
Yellow Perch	4	1	0		8	5		2	2	1		2	2		24							1	25	2.66%			
White Perch	5	2	1	3	4	3		1							15							4	19	2.02%			
Smelt			5			2		1		1		1			2							8	10	1.06%			
White Bass	1		1					1				3			5							1	6	0.64%			
Rainbow Trout	2		1					1							4							1	5	0.53%			
Lake Whitefish			1					1					1		2							2	4	0.43%			
Carp								1	1			2		1	3							3	3	0.32%			
Coho Salmon			1			1					1											3	3	0.32%			
Chinook Salmon								1																			
Walleye															1							1	1	0.11%			
Smallmouth Bass															1							1	1	0.11%			
Brown Bullhead															1							1	1	0.11%			
Freshwater Drum										1					1							1	1	0.11%			
Total	87	9	257	30	65	63	79	12	58	51	73	32	53	28	20	22	414	525	939	100.00%							

APPENDIX VI

PICKERING GILL NETS
MAY 28 & 29, 1985

MAY	PICKERING A DISCHARGE			PICKERING B DISCHARGE			DUFFIN CREEK			SIMCOE POINT						TOTAL 12M	TOTAL CATCH	% OF CATCH		
	3M	28	29	12M	28	29	3M	28	29	12M	28	29	3M	28	29				12M	29
Alewife	101	453	162	181	209	117	184	608	174	663	222	143	148	330	261	102	2195	1863	4058	89.70%
White Sucker	6	12	11	16	17	4	5	13	26	69	7	21	9	51	2	194	75	269	5.95%	
Lake Trout	4	2	4	4	4	1	4	6	9	3	2	7	2	2	1	9	23	35	1.28%	
Brown Trout	9	1	2	7	7	1	1	1	2	1	2	1	3	1	1	30	4	34	0.75%	
White Bass	6	12	4	4	1	1	1	1	1	1	2	1	1	1	1	22	7	29	0.64%	
White Perch	3	9	4	1	1	2	1	3	1	2	1	1	1	2	1	18	1	19	0.42%	
Saelt	2	1	4	1	4	1	2	3	1	1	1	1	2	1	4	13	17	0.38%		
Gizzard Shad	3	7	3	1	2	1	1	1	1	2	2	1	1	1	3	6	9	0.20%		
Round Whitefish																			0.18%	
Longnose Sucker																			0.04%	
Lake Whitefish																			0.02%	
Carp	1								1	2	2	1	1	2	1	7	2	8	0.02%	
Walleye																			0.02%	
Yellow Perch	1																		0.02%	
Brown Bullhead																			0.02%	
Total	136	496	185	209	245	131	195	631	214	741	237	173	168	386	265	112	2517	2007	4524	100.00%

APPENDIX VI (Cont'd)

PICKERING GILL NETS
AUGUST 21 - 22, 1985

AUGUST	PICKERING A DISCHARGE						PICKERING B DISCHARGE						DUFFIN CREEK						SIMCOE POINT						TOTAL 12M	TOTAL CATCH	% OF CATCH	
	21	22	21	22	12M	3M	21	22	21	22	12M	3M	21	22	21	22	12M	3M	21	22	12M	3M						
Alewife	6	4	79	193						224	99	78	82	35	91	121	139	279							1065	1495	77.06%	
White Sucker		6	9	1	2	6				1	2	26	12	1	1	15	26	1							16	109	5.62%	
Lake Trout			13	9						12	2	4	1	3	3	5	3	17							65	78	4.02%	
Smelt			9	11						7	2	1	2	2	9										48	51	2.63%	
Brown Bullhead	8	1			28	1						1	1			3	2									44	2.27%	
Coho Salmon			6	6						2	1	1	8	6	6		1	1	2						31	41	2.11%	
Brown Trout		2	9							1	1	1	5	3	1		5								15	29	1.49%	
White Perch	2	4			15	7											1									29	1.49%	
Gizzard Shad		4										10		1	2	2	3								1	20	1.03%	
Round Whitefish			2							2				6	2										12	12	0.62%	
Yellow Perch					3					1		5													1	9	0.46%	
Carp	3	2															2									7	0.36%	
Smallmouth Bass	4				1	1																				6	0.31%	
White Bass		3																								3	0.15%	
Lake Whitefish				1							2													3		3	0.15%	
Walleye		1																								1	0.05%	
Northern Pike		1																								1	0.05%	
Sculpin					1																					1	0.05%	
Rock Bass																1										1	0.05%	
Total	23	28	127	221	50	15	249	109	127	110	57	113	148	182	302	79	683	1257	1940	100.00%								

APPENDIX VI

PICKERING GILL NETS
NOVEMBER 26 - 28, 1985

NOVEMBER	PICKERING A DISCHARGE			PICKERING B DISCHARGE			DUFFIN CREEK			SIMCOE POINT			TOTAL 3M	TOTAL 12M	TOTAL 12M	TOTAL CATCH	% OF CATCH
	26	27	28	26	27	28	26	27	28	26	27	28					
Round Whitefish	1	3	6	2	1	8	1	12	2	2	16	10	5	5	2	28	27.97%
White Sucker	2	5	9	3	11	3	1	1	1	7	7	6	10	9	9	33	25.52%
Brown Trout	2	3	3	5	11	5	5	1	1	5	1	1	8	1	1	4	12.94%
White Perch	4	8	3	3	7	2	3	1	1	3	1	1	2	1	1	33	11.54%
Lake Trout	1				3	6	3	1	1	2	1	3	2	5	3	10	8.39%
Alewife			2	3	3	1	1	3	1	1	1	1	1	2	1	15	5.94%
Rainbow Trout	1				1	1	1	1	1	1	1	1	1	1	1	5	1.75%
Northern Pike		1								1	1					3	1.05%
Gizzard Shad										1	1					3	1.05%
White Bass										1						2	0.70%
Carp										1			1			2	0.70%
Yellow Perch		1			1					1			1			2	0.70%
Smelt																2	0.70%
Lake Whitefish					1				1							2	0.70%
Lake Chub																1	0.35%
Coho Salmon					1									1		1	0.35%
Total	11	18	23	8	38	25	18	3	24	11	28	17	27	9	18	123	100.00%

APPENDIX VII

COMMON AND SCIENTIFIC NAMES OF FISH SPECIES COLLECTED DURING THE 1984 AND 1985 PICKERING AQUATIC INTERIM STUDIES

Common Name	Scientific Name
Alewife	<u>Alosa pseudoharengus</u>
White Sucker	<u>Catostomus commersoni</u>
Brown Bullhead	<u>Ictalurus nebulosus</u>
Lake Trout	<u>Salvelinus namaycush</u>
Rainbow Smelt	<u>Osmerus mordax</u>
White Perch	<u>Morone americana</u>
Round Whitefish	<u>Prosopium cylindraceum</u>
Brown Trout	<u>Salmo trutta</u>
White Bass	<u>Morone chrysops</u>
Spottail Shiner	<u>Notropis hudsonius</u>
Gizzard Shad	<u>Dorosoma cepedianum</u>
Coho Salmon	<u>Oncorhynchus kisutch</u>
Yellow Perch	<u>Perca flavescens</u>
Golden Shiner	<u>Notemigonus crysoleucas</u>
Longnose Dace	<u>Rhinichthys cataractae</u>
Longnose Sucker	<u>Catostomus catostomus</u>
Carp	<u>Cyprinus carpio</u>
Smallmouth Bass	<u>Micropterus dolomieu</u>
Rainbow Trout	<u>Salmo gairdneri</u>
Pumpkinseed	<u>Lepomis gibbosus</u>
Lake Whitefish	<u>Coregonus clupeaformis</u>
Rock Bass	<u>Ambloplites rupestris</u>
Logperch	<u>Percina caprodes</u>
American Eel	<u>Anguilla rostrata</u>
Northern Pike	<u>Esox lucius</u>
Walleye	<u>Stizostedion vitreum</u>
Slimy Sculpin	<u>Cottus cognatus</u>
Goldfish	<u>Carassius auratus</u>
Lake Chub	<u>Couesius plumbeus</u>
Johnny Darter	<u>Etheostoma nigrum</u>
Fathead Minnow	<u>Pimephales promelas</u>
Common Shiner	<u>Notropis cornutus</u>
Quillback	<u>Cariacus cyprinus</u>
Black Crappie	<u>Pomoxis nigromaculatus</u>
Emerald Shiner	<u>Notropis atherinoides</u>
Chinook Salmon	<u>Oncorhynchus tshawytscha</u>
Freshwater Drum	<u>Aplodinotus grunniens</u>
Bluntnose Minnow	<u>Pimephales notatus</u>
Spotfin shiner	<u>Notropis spilopterus</u>

APPENDIX VIII.A

WATER TEMPERATURES DURING GILL NETTING PERIODS 1984

	PICKERING A DISCHARGE		PICKERING B DISCHARGE		DUFFIN CREEK		SIMCOE POINT	
	INSHORE	OFFSHORE	INSHORE	OFFSHORE	INSHORE	OFFSHORE	INSHORE	OFFSHORE
<u>MAY 10</u>								
3M surface	9.4	9.4	16.4	14.8	6.9	6.5	6.1	6
3M bottom	9	9.3	7.7	7.3	6.8	6.5	6.1	6
12M surface	6.1	6	5.2	5	6.6	6.9	7	7
12M bottom	5.2	5.2	5	4.9	5.7	5.5	5.1	5.1
<u>AUG 10</u>								
3M surface	26.2	26.2	27.8	25.3	22	21.6	21.1	21.1
3M bottom	27	20	25.8	20.6	20.4	20.3	20.3	20.6
12M surface	22.9	22	21.7	21.7	21.8	21.8	20.3	21.6
12M bottom	19.3	19.6	20.2	20.5	20.7	20.6	20.8	20.7
<u>NOVEMBER 5</u>								
3M surface	16.8	16.3	14.8	12.8	9.6	9.7	9.3	9.4
3M bottom	15.4	9.8	9	9	9.1	9.3	9.3	9.2
12M surface	12.2	12.2	9.8	9.7	9.6	9.7	9.2	9.2
12M bottom	9.4	9.1	8.4	8.2	8.6	8.5	8.6	8.6

1985

	PICKERING A DISCHARGE		PICKERING B DISCHARGE		DUFFINS CREEK		SIMCOE POINT	
	INSHORE	OFFSHORE	INSHORE	OFFSHORE	INSHORE	OFFSHORE	INSHORE	OFFSHORE
<u>MAY 27</u>								
3M surface	9.6		9.1		9.2		9.1	
3M bottom					no data			
12M surface	7		7.8		8		7.9	
12M bottom					no data			
<u>AUGUST 21</u>								
3M surface	21.5		26		21		19	
3M bottom					no data			
12M surface	19.3		19		21		20.5	
12M bottom					no data			
<u>NOVEMBER 25</u>								
3M surface	8.3	8.3	13.6	12.5	5.7	5.7	6	6.1
3M bottom	5.5	5.5	6.7	6.5	5.6	5.6	6	5.5
12M surface	4.8	4.8	4.5	4.5	5.6	4.9	5.1	5
12M bottom	4.9	4.9	4.5	4.5	5.4	4.7	4.9	4.8

APPENDIX VIII.B

BOTTOM TEMPERATURES RECORDED DURING FISHING PERIODS

TRAP NETS

Date	A DISCHARGE	B DISCHARGE	SIMCOE POINT
	Mean °C (Range)		
1984			
May 16 - 19	6.3 (4.6 - 10.0)	6.6 (5.1 - 10.9)	6.3 (5.7 - 7.9)
Aug 8 - 10	17.0 (13.1 - 23.2)	17.8 (14.0 - 23.0)	
Aug 13 - 15			22.4 (18.4 - 24.1)
Nov 12 - 14	7.9 (7.2 - 9.6)	8.9 (7.6 - 13.4)	6.9 (5.2 - 8.1)
1985			
May 22 - 24	No data	6.8 (6.0 - 8.4)	No data
Aug 13 - 15	20.8 (20.0 - 22.8)	20.5 (20.1 - 21.5)	20.6 (19.3 - 22.0)
Nov 11 - 13	9.5 (8.8 - 11.2)		
Nov 12 - 14		9.0 (6.4 - 10.3)	
Nov 12 - 15			9.2 (7.0 - 10.6)

GILL NETS

1984			
May 10 - 15	3 m	No data	8.0 (7.1 - 9.1)
	12 m	No data	7.2 (5.9 - 8.4)
Aug 13 - 15	3 m	22.9 (19.6 - 24.0)	6.0 (5.4 - 6.5)
	12 m	No data	5.6 (5.1 - 6.2)
Nov 5 - 7	3 m	8.8 (7.2 - 11.9)	22.9 (20.6 - 23.7)
	12 m	No data	22.4 (18.4 - 24.0)
	3 m		21.1 (15.7 - 22.6)
	12 m		21.7 (17.8 - 23.0)
	3 m		8.7 (6.9 - 10.2)
	12 m		7.8 (6.5 - 9.1)
1985			
May 27 - 29	3 m	No data	9.9 (8.9 - 11.2)
	12 m	No data	7.9 (6.0 - 8.9)
Aug 20 - 22	3 m	14.7 (8.9 - 19.8)	No data
	12 m	No data	No data
Nov 25 - 28	3 m	8.1 (7.5 - 8.7)	14.6 (10.1 - 20.0)
	12 m	No data	10.5 (8.6 - 15.5)
	3 m		6.1 (5.4 - 6.2)
	12 m		5.7 (5.4 - 6.2)

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